Route to:

Return to:

INSTITUTE OF GAS TECHNOLOGY

THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY

CHICAGO 16, ILLINOIS

GAS ABSTRACTS

JUNE, 1957

VOLUME 13 NUMBER 6

AFFILIATED WITH

ILLINOIS INSTITUTE OF TECHNOLOGY

CONTENTS

1. Gas Industry 101
2. Appliances 102
3. Combustion and Industrial Furnaces..... 103
4. Gasification and Carbonization 105
5. Natural Gas and Natural Gas Condensates..... 107
6. Petroleum and Synthetic Liquid Fuels..... 112
7. Analytical Methods and Tests..... 115
8. General and Physical Chemistry..... 116
9. Organic Chemistry, and Petrochemicals..... 119
10. Chemical Engineering 119
11. Process Equipment and Instrumentation..... 121
12. Materials of Construction, and Corrosion..... 123
13. New Books 124

O. P. BRYSCH, Editor

GAS ABSTRACTS is published and distributed monthly by the Institute of Gas Technology, Chicago 16, Illinois. The contents of selected papers and patents are reviewed impartially by the editorial staff and material of potential interest to the Gas Industry is presented. Subscription rates to non-members of the Institute: $18.00 per year to U.S. addresses; $22.00 foreign.—Printed in the U.S.A.

Copyright 1957 by the Institute of Gas Technology.

A microfilm edition of Gas Abstracts can be supplied by University Microfilms, 313 N. First St., Ann Arbor, Michigan.

1. GAS INDUSTRY

Atomic Energy Contracts

Tybout, R. A. GOVERNMENT CONTRACTING IN ATOMIC ENERGY. Ann Arbor: University of Michigan Press (1956).

This study of the American atomic energy industry deals primarily with the type of contract arrangements used over past years between government and private industry. These include fixed-price, variable-price, and cost-plus-fixed-fee contracts. Fixed-price contracts have been employed only to a minor extent since they can be applied advantageously only in cases where the risk assumption is achieved through the use of variable price contracts. Over 80% of government contracting is achieved under a cost-plus-fixed-fee basis, which implies full acceptance of uncertainties and risk contingencies by the government. There is no set rule for determining the amount of fixed fee in many cases, since the contract is primarily administrative in nature. An evaluation of the results obtained under cost-plus-fixed-fee contracting and specific examples of its efficiency in operation are included. C. G. von Fredersdorff

Education

Elliott, M. A. THE IGT RESEARCH PROGRAM. *Gas Age 119*, 30-31, 34 (1957) March 21.

The Institute of Gas Technology's research and education activities cover a broad range from gasification of coal and oil to nuclear science and petrochemical production, from studies of physical structures of gases and gaseous mixtures to use of digital computers in solving distribution problems. Highlights are given of the Institute's broad-scope basic and sponsored research programs for the Gas Industry.

E. B. Shultz

Sandek, L. EDUCATION FOR ENGINEERING—U.S.S.R. *Research and Eng. 3*, 12-14, 34-7 (1957) April.

The U.S. position of 1950 in educating twice as many engineers as U.S.S.R. has become almost exactly reversed by 1955. Our educational system and philosophy is compared with that of Russia in a broad review. O. P. Brysch

Fission Product Safety

Zeitlin, H. R., Arnold, E. D. and Ullmann, J. W., ECONOMICS OF WASTE DISPOSAL. *Nucleonics 15*, p. 58-62 (1957) January.

If the installed electric generating capacity of the U.S. will increase eight-fold in the next 50 years, and if the nuclear electric capacity will be 500,000 kw in 1960, and half of all new generating plants to be built in 2000 AD will be nuclear, then it is estimated that the accumulated fission-product radioactivity will be 300 billion curies by the year 2000. An elaborate system of waste storage-tanks and disposal pits sunk into the ground will be required to handle this radioactivity. Normally a long cooling period is allowed to decrease the level of activity and remove the more active isotopes, such as strontium-90 and cesium-137, before final disposal of waste fission products. Based on nuclear electric power costs of 8 mills kwh, and allowing 1% of power costs for waste disposal, it is estimated that the permissible range for waste treatment, shipping and dispoosal is $1.60 to $64.00 per gal. waste depending on nuclear fuel enrichment and burnup. Graphical results are included. C. G. von Fredersdorff

Gas and Mathematics

Woodcock, E., APPLICATION OF MATHEMATICAL TECHNIQUES TO GAS RESEARCH PROBLEMS. *Gas J.* (British), 301-06 (1957) February 6.

An interesting, though brief, general discussion of this subject. The basic steps of the scientific approach are briefly outlined, the manner in which abstract mathematical models are developed to represent physical problems is pointed out, and the applications of dimensional analyses, statistics, and operations research techniques to gas industry problems are briefly considered. G. G. Wilson

Pipeline Construction

WHAT'S HAPPENING IN PIPE LINE CONSTRUCTION. *Pipe Line Ind. 6*, 66-80 (1957) March.

A series of articles is followed by a table describing proposed pipeline construction. This table includes the length in miles, the diameter, the type, the origin and terminus, the estimated cost, and the present status for each pipeline.

H. L. Feldkirchner

Utility—LP Unity

UNIFIED GAS INDUSTRY PROMOTION. PART SIX: UNITY ON THE TOP LEVEL. *Butane-Propane News 19*, 49, 51 (1957) March.

This concluding installment outlines the national unity program of LP-gas dealers and utility gas companies, the local effort in Milwaukee, and a brief description of the expansion of the All-Gas Unity Program all over the country.

C. E. Pierson

2. APPLIANCES

Air Conditioning

Ourusoff, L., PUSH GAS COMMERCIAL COOLING NOW. *Amer. Gas Assn. Monthly 39*, 7, 47 (1957) April.

The author suggests that manufacturers of gas air conditioning equipment take advantage of the increasing size of the air conditioning market, which will reach an estimated value of four to five billion dollars within three years.

H. L. Feldkirchner

CUT COOLING COSTS. *Gas Heat 8*, 50, 72, 73 (1957) March.

A transcription of a panel discussion on the effect of attic-space forced ventilation on cooling costs given at a convention of the National Warm Air Conditioning Association. This discussion was concerned with the results of an investigation on this subject at the University of Illinois. G. G. Wilson

NEW DESICCANTS ENTER REFRIGERANT FIELD. *Chem. Eng. 64*, 174, 176-182 (1957) February.

One of the new applications of molecular sieves is discussed. R. T. Ellington

RESIDENTIAL COOLING ESTIMATE. *Gas Heat 8*, 39, 44, 46, 48 (1957) March.

A brief statistical resumé of domestic cooling installations in 1956 is given. G. G. Wilson

Customer Service

LONE STAR ACCELERATES SERVICE. *Amer. Gas Assn. Monthly 39*, 8-9, 41 (1957) April.

Lone Star Gas Company is expanding physical properties, streamlining customer service methods, and installing an automated system of operations in order to meet present and projected population growth in the Dallas area.

H. L. Feldkirchner

Heating Sales

GAS HEAT TAKES THE LEAD. *Gas Heat 8*, 27-34, 37-39, 42 (1957) March.

A statistical summary of space and water heating gas appliance sales is given for 1956. A tabulated comparison of quarterly shipments, sales and stocks of these appliances for 1955 and 1956 is included. G. G. Wilson

Non-Aerated Pilots

Lowe, F. J., Jr. NON-AERATED PILOTS FOR HOUSEHEATING BURNERS. *Gas Heat 8*, 44. 46, 48 (1957) March.

The current status of non-aerated pilots for househeating equipment is discussed. The results of up to three years field testing and "lint box" tests of this type of pilot are briefly summarized. G. G. Wilson

Rate Changes, 1955

GAS RATE CHANGES ARE RELEASED. *Amer. Gas Assn. Monthly 39*, 23 (1957) April.

The Rate Committee of the American Gas Association has just released the final results of its ninth consecutive annual compilation of gas rate changes which were instituted during 1955.

Author's Abstract

Space Heating

Burrell, A. V. and Fuidge, G. H. DOMESTIC SPACE HEATING BY GAS. *Gas Times* (British) *90*, 198, 201 (1957) March 1.

The questions of domestic space heating are reviewed with respect to performance of the principal types of appliances in various dwellings. O. P. Brysch

Water Heating

Lieberg, O. S. COMPONENTS OF HIGH TEMPERATURE WATER SYSTEM. *Air Condg., Heatg., Ventilg. 54*, 80-87 (1957) March.

As a follow-up to the Reference Section on High Temperature Water in the September issue, the author here discusses in further detail certain equipment used in these systems including combustion controls, distribution piping,

system circulation pumps, and control valves. Author's Abstract

Turner, G. W., PUSH SALES ON WATER HEATERS. *Amer. Gas Assn. Monthly 39*, 21, 43 (1957) April.

Sales campaigns conducted by the Equitable Gas Company of Pittsburgh to sell the advantages of quality as well as quantity gas appliances are described. H. L. Feldkirchner

Weather Forecasting

Krick, I. P. LONG RANGE WEATHER FORECASTING BY ELECTRONIC COMPUTER. *Gas Age 119*, 33, 34 (1957) March 21.

The article reviews the explanatory statements of Dr. Krick, a "weather engineer" and meteorologist. Based upon the rhythm of pressure patterns in the earth's atmosphere, the use of the Univac Computer permits the projection of sufficient past weather data to forecast future weather at a given location. O. P. Brysch

DEGREE DAY TABLES. *Gas Heat 8*, 82 (1957) March.

A table of degree day occurrence in January of 1956 and 1957 and for the 1956 and 1957 heating seasons from September through January for 39 larger U.S. cities. G. G. Wilson

3. COMBUSTION AND INDUSTRIAL FURNACES

Air Pollution

Faith, W. L., Renzetti, N. A., Rogers, L. H. THIRD TECHNICAL PROGRESS REPORT. Air Pollution Foundtn. Report No. 17, Los Angeles: (1957) March.

This Third Progress Report presents initial basic information on the broad problem of air pollution abatement. The program of 1956 was directed to extending knowledge of the nature, effects and means for control of auto exhaust and incinerator emissions, now more definitely known as the principal producers of smog. Their detection, source of production, chemistry, and effects in the atmosphere are summarized. O. P. Brysch

Combustion Research

Greifer, B., Cooper, J. C., Gibson, F. C. and Mason, C. M. COMBUSTION AND DETONATION IN GASES. *J. Appl. Physics 28*, 289-294 (1957) March.

Streak schlieren photographs of hydrogen-oxygen and carbon monoxide-oxygen explosions were taken. The photographs show that compression waves generated during the early stages of propagation soon steepen into a shock wave which travels ahead of the combustion wave. P. Burket

Whittaker, A. G., Williams, H. and Rust, P. M. BURNING-RATE STUDIES. A NEGATIVE PRESSURE EXPONENT IN THE CONSUMPTION-RATE EQUATION FOR A LIQUID SYSTEM. *J. Chem. Physics 26*, 717-18 (1957) March.

In order to get more information on the kinetics of the combustion of two-component systems, a study of nonstoichiometric mixtures was initiated on a nitropropane-nitric acid system. G. Kunst

Wolfson, B. T., and Dunn, R. G., GENERALIZED CHARTS OF DETONATION PARAMETERS FOR GASEOUS MIXURES. *Ind. Eng. Chem. Data Series 1*, 77-82 (1956) November.

Generalized charts of detonation parameters for all gaseous mixtures, involving only non-dimensional quantities, have been developed and are presented as an aid in visualizing the relationship between various detonation parameters. B. E. Eakin

THE PURE OZONE TO OXYGEN FLAME. (Commun. to Editor) *J. Amer. Chem. Soc. 79*, 1517-18 (1957) March 20.

Fuel Competition

L'Hote, J. D., COAL vs. GAS vs. OIL HEATING. *Coal-Heat 72*, 5-7 (1957) February.

The three fuels are compared by the supervising engineer of Detroit schools, who reviews factors such as fuel availability, trends, capital cost, fuel storage and total costs. With present stoker equipment, modernization must not be assumed to be substitution of gas and oil for coal firing. O. P. Brysch

FUEL & LABOR COSTS. *Coal-Heat 72*, 12, 14 (1957) February.

Excessive labor and maintenance costs used in

Dept. of Army estimates have forced anthracite out of competition with gas. Fort Devens (Army) costs of $14.00 labor per ton anthracite, or $12.15 for all coals are claimed as typical firing labor; Mechanicsburg and Philadelphia (Navy) show $8.02 and $4.90 per ton respectively. O. P. Brysch

Electric Rates

Davis, L. W. HOW TO STRETCH YOUR POWER DOLLAR. *World Oil 144,* 49-51 (1957) February 1.

Savings on electric power bills can be made by taking advantage of lowest rates to which users are entitled. Author's Abstract

High Temperatures

Hiester, N. K., Ferguson, F. A. and Fishman, N. HIGH TEMPERATURE TECHNOLOGY. *Chem. Eng. 64,* 237-252 (1957) March.

Present high temperature processes are discussed along with laboratory techniques for ultra-high temperatures. W. G. Bair

Nuclear Fuel Systems

Handwerk, J. H. and Noland, R. A. OXIDE FUEL ELEMENTS FOR HIGH TEMPERATURES. *Chem. Eng. Progress 53,* 60F-62 (1957) February.

Nuclear reactors operating in the higher temperature regions are expected to use ceramic fuel elements consisting of oxides of uranium and thorium separately or mixed with inerts (SiO_2 or SiC). Oxides of uranium have been fired to 1750° C. in the preparation of fuel pellets. Irradiation tests on a sample of uranium and thorium oxides showed some disintegration at surface temperatures of 1060° C. Problems inherent in ceramic nuclear fuels are poor thermal conductivity, and escape of volatile fission products due to fissuring. Uranium and thorium oxides have greater dimensional stability and corrosion resistance than metallic fuel elements. C. G. von Fredersdorff

Wheeler, J. A. (assigned to United States of America) NEUTRONIC REACTOR. U.S. 2,782,158 (1957) February 19.

The patent cites a reactor concept wherein circulating helium gas is heated by uranium spheres contained in a multiplicity of graphite tubes housed in a spherical-shaped pressure vessel. C. G. von Fredersdorff

Package Boiler

BCR DESIGNS AND BUILDS NEW PACKAGE BOILER. *Bitum. Coal Resch. 17,* 5, 6 (1957) Spring.

Requirements ranging from 1500 to 20,000 lb steam per hour at pressures up to 300 psi for space heating, process hot water, and process steam can be satisfied by the new BCR package boiler. This is a fully-automatic, stoker-fired, water-cooled grate unit, expected to compete favorably with all other fuels. O. P. Brysch

Slagging Furnaces

Grasme, P. STATE OF SLAGGING FURNACE DEVELOPMENT IN GERMANY. *Combustion 28,* 34-41 (1957) February.

The popularity of steam generating units operating with slagging furnaces has been increasing in Germany to the point where they constitute over 80 percent of the new installations. Slagging furnaces, by removing the ash as a slag, reduce the difficulties and costs of fly-ash disposal. Presently, such furnaces in Germany burn bituminous coals with 8 to 40 percent volatile matter and with 5 to 40 percent ash content. The present state of development is reviewed along with the nine different slagging furnace designs currently in use. Coals having ash fluid temperatures up to 1650° F. are normally used, since coals with higher fluid temperatures have proven unsatisfactory. Tests have shown that the latter can be made suitable for slagging operation by the addition of about 1 percent marl (90.15 percent $CaCO_3$ or lime). One percent of these additives reduces the fluid temperature by about 180° F. E. J. Pyrcioch

Turbine Ship

G. E. Staff. LIBERTY SHIP JOHN SERGEANT: VARIATIONS ON AIRCRAFT TECHNOLOGY MAKE MARITIME HISTORY. *General Electr. Rev. 60,* 6-11, (1957) March.

Sea-trials are described for the John Sergeant, one of four Experimental Ships of the Maritime Administration's reserve fleet of Liberty cargo type. A marine gas-turbine drive, slimming bow section, and pitch-controllable propeller raised the old 11.4-knot sea speed to 17 knots. Bunker C, washed to remove sodium and vanadium, is the fuel. O. P. Brysch

4. GASIFICATION AND CARBONIZATION

Catalytic H_2S Removal

Thumm, W., Roesner, G., and Vok, F. (assigned to Metallges. A. G.) PROCESS FOR THE PRODUCTION OF SULFUR FROM HYDROGEN SULFIDE AND SULFUR DIOXIDE OR OXYGEN CONTAINING GASES. U.S. 2,785,056 (1957) March 12.

An improved process is described in which two or more catalyst beds are used; one maintained at a temperature above the dewpoint of the sulfur produced and another below the dewpoint. Means are provided for switching the beds when sulfur deposited on the low temperature catalyst bed reduces its activity. D. M. Mason

Voreck, W. E., Jr. (assigned to Standard Oil Co.) SULFUR REMOVAL IN GAS COOLING. U.S. 2,775,311 (1956) December 25.

The cooling efficiency of a heat exchanger in cooling gas from which sulfur is condensed is maintained by introducing a liquid hydrocarbon oil to dissolve sulfur deposits. D. M. Mason

Coal Gasification

Von Fredersdorff, C. G., Pyrcioch, E. J. and Pettyjohn, E. S. GASIFICATION OF PULVERIZED COAL IN SUSPENSION. Institute of Gas Technology (Chicago) Research Bulletin 7 (1957) January. $5.00.

This Bulletin presents experimental data and observations obtained in a study of the gasification of pulverized Illinois noncoking and West Virginia low and high ash-fusion coking coals in suspension with air, oxygen and steam mixtures, at 1.5-7.5 atmospheres pressure, in a pilot scale, slagging type, continuous downflow generator originally designed for processing 500 lb. coal/hr. It also presents a summary of the initial IGT gasification studies, made with an atmospheric pressure gasification unit.

C. G. von Fredersdorff

Coal Research

Mantel, W. and Hansen, H. ZUSAMMENHAENGE UND NUTZANWENDUNG DER ERGEBNISSE AUS LABORATORIUM UND PRAXIS: UEBER DAS VERHALTEN DER RUHR-STEINKOHLEN BEIM ERHITZEN UNTER LUFTABSCHLUSS UNDER BESONDERER BERUECKSICHTIGUNG DER VORGANGE IM "PLASTISCHEN BEREICH". (CORRELATION AND USE OF RESULTS FROM LABORATORY AND PRACTICE: THE BEHAVIOR OF RUHR COAL DURING HEATING WITH EXCLUSION OF AIR WITH SPECIAL CONSIDERATIONS OF THE PROCESSES IN THE "PLASTIC REGION".) *Brennstoff-Chemi* (German) *38*, 87-92 (1957) March 13.

Results of studies of Ruhr coals using the Ruhr dilatometer and the Radmacher devolatilizer test are correlated with industrial coke-oven operations and coke properties. The collected data of the numerous earlier investigations on Ruhr coal are compared to get a better understanding of the coal in the plastic region, and the influence of mineral matter and metal oxides on the properties of swelling, caking and coke-forming, and expansion. G. Kunst

Kirsch, H. DIE ANWENDUNG DER DIFFERENTIALTHERMOANALYSE BEI DER KOHLENUNTERSUCHUNG. (THE APPLICATION OF DIFFERENTIAL THERMOANALYSES IN COAL EXAMINATION. *Brennstoff-Chemie* (German) *38*, 87-92 (1957) March 13.

After a brief summary of the apparatus and the method used, the possibilities of determination of coal and rock minerals, hard to identify because of their fine grained structure, are presented with examples. Furthermore a critical review about the application of the DTA for actual coal research is given in regard to coalification, coking properties and combustion.

G. Kunst

Domestic Coke

Sullivan, W. THE IMPORTANCE OF COKE. *Gas World* (British) *145*, 430-31 (1957) February 23.

Large demands for smokeless fuels will develop when the Clean Air Bill becomes effective in Britain in 1958. Gas works coke, as well as gas, must supply much of this demand. Needed improvements in coke quality and production, and in design of appliances for domestic and industrial use of coke are outlined briefly.

O. P. Brysch

THE GARSTON COKE PREPARATION AND STORAGE PLANT. *Coke and Gas* (British) *19*, 89-95 (1957) March.

British fuel problems will be alleviated by use of carefully prepared gas-house coke. Complete modern facilities of the Garston (Liverpool) plant are described. O. P. Brysch

Dry Purification

Cope, F. H., THE QUANTITIES INVOLVED IN THE RATING AND PERFORMANCE OF OXIDE PURIFIERS. *Gas J.* (British) 567, 568, 573-76 (1957) March 13.

After a review of earlier work relating to oxide-box removal of H_2S and slippage, directions are given for calculating the efficiency and value of the oxide charge. O. P. Brysch

Schaub, F. (assigned to Ruhrchemie A-G.) PURIFICATION OF GASES WITH SHAPED PURIFYING MATERIALS. U.S. 2,780,310 (1957) February 5.

Crushing of shaped purifying materials such as iron ore, due to the weight overlying, is avoided by increasing the rate of upward flow of gas until the weight of the material is almost completely counteracted. D. M. Mason

Grindability

Fitton, A., Hughes, T. H. and Hulrey, T. F. THE GRINDABILITY OF BRITISH COALS —A LABORATORY EXAMINATION. *J. Inst. Fuel* (British) *30*, 54-65 (1957) February.

Grindability tests have been carried out on two laboratory apparatus for determining grindability (a Hargrove machine and a ball mill) to determine to what extent the properties of British coals affect the ease with which they can be ground. There was a good correlation between the grindability indices obtained with the two machines. In general only a broad relationship was found between grindability index and the properties of the coal substance. A closer relation between grindability and the contents of volatile matter, carbon and hydrogen was found when caking power was taken into account. Authors' Abstract

Pomeroy, C. D. A SIMPLE METHOD FOR THE ASSESSMENT OF COAL STRENGTH. *J. Inst. Fuel* (British) *30*, 50-54 (1957) February.

The development of a simple empirical strength test for coal is described. The test consists of the degradation of a closely graded coal sample inside a closed cylinder by a succession of hammer drops. An impact strength index is defined as the percentage of coal remaining in the original size interval after degradation. The test parameters are extremely important and experiments have shown the most suitable size range of the fragments, the magnitude of the weight and the number and height of the drops. The impact strength indices of nine distinct coals are shown to correlate closely with the mean compressive strengths of one-inch cubes of the coals. Author's Abstract

Hydrogen Plant

NEW PROCESS FOR PORTABLE HYDROGEN PLANT SOLVES FIELD SUPPLY PROBLEM. *Chem. Eng. 64*, 148-150 (1957) March.

A 1000 SCF/hr hydrogen plant built by Girdler Co. for the Army is completely trailer mounted for mobility and utilizes the steam reforming of diesel oil. W. G. Bair

Liquid Purification

Bloch, H. S. and Mammen, H. E. (assigned to Universal Oil Products Co.) GAS PURIFICATION PROCESS. U.S. 2,781,863 (1957) February 19.

Hydrogen sulfide and other acidic gases are removed from gas mixtures such as hydrogen and light hydrocarbons by contacting with an anhydrous absorbent consisting of a mixture or solution of a hydrocarbon and an anhydrous glycol, polyalkylene glycol, or an ether or ester of a glycol. Simultaneous dehydration and acidic gas removal may be effected. Regeneration is readily effected, since the process is essentially one of physical solution. D. M. Mason

Miller, R. (assigned to American Development Corp.) REMOVAL OF ACIDIC SULFUR COMPOUNDS WITH CAUSTIC-ZINC SOLUTIONS. U.S. 2,783,184 (1957) February 26.

Zinc is added to alkali metal hydroxide solutions used for removal of hydrogen sulfide from hydrocarbon fluids. Regeneration then consists simply of filtering out precipitated zinc sulfide. Removal of hydrogen sulfide and mercaptan can be carried out simultaneously, since sulfide is not present to interfere in the oxidative re-

generation of mercaptide-containing caustic solution. D. M. Mason

Mercaptan Removal

Stine, H. M. (assigned to Standard Oil Co.) CONTINUOUS PROCESS FOR THE REMOVAL OF MERCAPTANS FROM HYDROCARBONS AND APPARATUS THEREFOR. U.S. 2,779,712 (1957) January 29.

A continuous process for removal of mercaptans from liquid hydrocarbons is carried out in an apparatus wherein the hydrocarbon is flowed over one side of a microporous carbon layer, and aqueous caustic solution is flowed over the other side. The carbon layer may, for example, be porous carbon pipe. The mercaptan reacts with the caustic (which preferentially wets the carbon), diffuses through the pipe and is carried away with the caustic solution.

D. M. Mason

Sulfur Recovery

Dunning, H. N. and Lien, A. P. (assigned to Standard Oil Co.) REGENERATION OF HYDROGEN SULFIDE ABSORBENT AND MANUFACTURE OF SULFUR. U.S. 2,772,945 (1956) December 4.

Soda lime used for absorption of hydrogen sulfide may be regenerated by passing through it an oxidizing gas such as air or sulfur dioxide after kindling the reaction by heating a portion of the absorbant to about 1600 to 1800° F.

D. M. Mason

Water Gas

Birks, F. M. THE GLASGOW MEMORIAL LECTURE. *Gas J.* (British) *289*, 507-10, 514, 515 (1957) March 6; *Gas Times* (British) *90*, 234-5 (1957) March 15.

The technical achievements of Dr. A. G. Glasgow of Humphreys and Glasgow, who died in 1955, are reviewed in a detailed account of the development of the Lowe water gas process into the modern peak load plant. O. P. Brysch

5. NATURAL GAS AND NATURAL GAS CONDENSATES

Casing Corrosion

Brady, H. A., HOW MAGNESIUM ANODES RETARD CASING CORROSION. *World Oil 144*, 160-162, (1957) January.

A brief, general discussion of the use of cathodic protection to mitigate oil well casing corrosion.

G. G. Wilson

Sudbury, J. D., EXTERNAL CASING CORROSION: CAUSE, EFFECT AND CONTROL. *World Oil 144*, 163-170, (1957) January.

Includes brief discussions of the causes of external casing corrosion, the use of casing potential profiles to detect corrosive areas and the effectiveness of cathodic protection in preventing this type of corrosion. G. G. Wilson

Compression

Bell, H., IN LONESOME WEST TEXAS PUSHBUTTONS TAKE OVER BOOSTER STATION OPERATION. *Petroleum Eng. 29*, D-29-D-33, (1957) February.

The successful operation of two intermediate compressor stations by remote control is presented. B. E. Eakin

Sanders, G. VAPOR-PHASE COOLING. PART 4. ENERGY LOSSES REDUCED, ENGINE OUTPUT INCREASED BY VAPOR-PHASE COOLING. *Petroleum Eng. 29*, D46, 48, 50-51 (1957) January.

The advantages inherent in the vapor-phase cooling system are discussed. Various cycles and modifications required are illustrated.

B. E. Eakin

Condensate Removal

Wiggins, J. L. NATURAL GAS PROCESSING BY LOW TEMPERATURE SEPARATION. *Petrol. Eng. 29*, B65, 68, 73 (1957) February.

The addition of hydrate inhibitors and stabilizers in cold-separation systems have increased the efficiency of field installations in many instances by more than 50 per cent. The hydrocarbons are stripped from gases in the field rather than being wasted, and stock tank losses in gravity and volume are lessened. Many variations of the basic equipment mentioned here are being employed and many refinements are in progress. The efforts of the industry within the past two decades toward the prevention of waste and the conservation of natural resources establish a very commendable achievement.

G. Kunst

Deep Wells

Adams, E. 150 DEEP WELLS COST $100,000,000 in 1956. *Petroleum Eng. 29*, B21-30 (1957) March.

The deep wells (below 15000 feet) drilled in 1956 are discussed from viewpoint of cost, depth, production and location. A descriptive tabulation by states of all wells is included.

O. P. Brysch

Desiccants

MOLECULAR SIEVES PROCESSING TOOL OF THE FUTURE? *Petroleum Eng. 29,* C-53, 54, (1957) February.

Some of the problems associated with the use of molecular sieves as desiccants are discussed.

B. E. Eakin

Dispatching

Neubauer, J. R. PIPE LINE COMMUNICATION AND CONTROL. *Petroleum Eng. 29,* D38, 40, 42, 44 (1957) January.

The integration of mobile VHF equipment with microwave radio installations provides effective communications coverage for large vehicular systems without the need for multiple VHF channels.

B. E. Eakin

Wright, D., EL PASO NATURAL OPERATES VAST COMMUNICATIONS SYSTEM. Gas *33,* 113-18 (1957) March.

The communications system of the El Paso Natural Gas Co. and its operation are described.

G. G. Wilson

Drilling

Radford, L. R., AIR DRILLING PAYS DIVIDENDS. *Petrol. Eng. 29,* B-21-27 (1957) January.

Magnolia reports a direct saving on drilling costs, straighter hole, faster penetration, and fewer bits in drilling three wells in the Vacuum Field in New Mexico.

B. E. Eakin

OPERATORS ASK: WHY IS DRILLING OFF? *Oil Gas J. 55,* 66-67 (1957) March 4.

Active rigs in the U. S. totaled only 2294 in February, 188 fewer than a year ago, and completions totaled about 400-615 fewer than for 1956. The main factors contributing to the situation were adjudged tight money, political uncertainty, and offshore and foreign operations.

R. T. Ellington

Drilling Patents

Bell, L. A. (assigned to Bell Corp.) AUTOMATIC DRILLING FEED CONTROL. U.S. 2,783,-968 (1957) March 5.

Carle, G. F. and Baker, B. M. (assigned to Engineering Laboratories, Inc.) APPARATUS FOR EARTH BORING WITH PRESSURIZED AIR. U.S. 2,783,971 (1957) March 5.

Fahlmann, H. B. (assigned to A. G. Grundwasserbauten) INSTALLATION FOR MAKING BORES IN A STRATUM. U.S. 2,783,972 (1957) March 5.

Gillespie, S. S. APPARATUS FOR UNDERWATER OIL WELL DRILLING. U.S. 2,783,970 (1957) March 5.

Hawthorne, H. J. and Weaver, E. M. DRILL BIT. U.S. 2,783,973 (1957) March 5.

Mickle, V. C. (assigned to G. E. Failing Co.) APPARATUS FOR CIRCULATING DRILLING FLUID IN ROTARY DRILL. U.S. 2,786,-651 (1957) March 26.

Uhland, H. E. (assigned to International Minerals and Chemical Corp.) METHOD AND APPARATUS FOR CUTTING CORES. U.S. 2,-783,969 (1957) March 5.

Wells, N. C. BOTTOM HOLE PRESSURE CONTROL IN WELL DRILLING. U.S. 2,786,-652 (1957) March 26.

Exploration

Powell, W. K. GEOLOGY AND THE GAS INDUSTRY (AMERICAN GAS FUNDAMENTALS—NATURAL GAS) *Amer. Gas J.* 184-36-40 (1957) March.

A general but tersely phrased review of geological fundamentals is used to explain the origin and migration of petroleum, as well as exploration and prospecting activities of natural gas and oil industries.

O. P. Brysch

Fluid Flow

Collis, H. C. FORMULA FOR HORIZONTAL FLOWLINES FOR HIGH PRESSURE CRUDES. *J. Inst. Petrol.* (British), 57-63 (1957) February.

An estimation of size and performance of flowlines is usually needed most during the early stages of production development. A number of formula have been developed for two-phase flow, most of which are applicable only for special cases and conditions. Usually a fairly detailed physical analysis of the crude is required before formula can be applied. Much of this

information is not available in practice. Using existing p-v-t analyses, general pressure-density relationships have been developed, so that, used in conjunction with the general energy equation, an assessment can be made from a minimum of fluid data. The main assumption that has been made is that the gravity of the oil and gas, the gas-oil ratio (G.O.R.) at any temperature, and the mean temperature, which are the data in question, are the chief factors affecting the flow properties. It is not practical to derive a universal formula, to suit all pressures, as the flow pattern undergoes abrupt changes. The scope of this paper covers flowline pressures of 200-2000 psi and G.O.R. at 100° F. of 400-1400 cu ft/bbl. Author's Abstract

Legal Problems

Keplinger, C. H. LAWYER AND ENGINEER SOLVE OIL PROBLEMS. *World Oil 144*, 83-87, (1957) January.

A short discussion of the necessity for cooperation between lawyers and engineers to solve many oil industry problems such as the preparation of drilling contracts, proper well spacing and unitization. G. G. Wilson

Logging

Hamilton, R. G. and Charrin, P. QUANTITATIVE LOG ANALYSIS: 4-HOW TO DETERMINE TRUE RESISTIVITY. *Oil Gas J. 55*, 161-63 (1957) February 18.

A method of correcting apparent resistivity for the influence of other media in the vicinity of the bore hole. Charts used in making these corrections are included. G. G. Wilson

Miller, C. R. Jr., Evans, C. B. LOGS AND CORES INDICATE POROSITY. *World Oil 144*, 115-119, (1957) January.

A brief analysis of the use of contact logs in conjunction with sidewall curves to determine the porosity of underground rock structures. G. G. Wilson

LP-Gas Storage

DEEP FREEZE FOR STANDBY PLANT LP-GAS. *Amer. Gas J.*, 18-20 (1957) March.

A refrigerated tank for storing standby liquid propane at low-pressure combines cost economy with economy of space at Atlanta Gas Light Company's Riverdale Plant. Steel used is less than six percent of that required for pressure-storage of propane. Safety precautions include adequate insulation material, auxiliary generator, pop-off valve, bleed line to flare, and earthen dike topped with pilot lights. J. J. Guyer

A FIRST: REFRIGERATED PROPANE STORAGE. *Gas Age 119*, 13-15 (1957) February 21.

Liquid propane is stored by refrigeration rather than pressure. Liquid propane at 100 pounds pressure is flashed into a low-pressure tank held at —46° F. The flashing serves as the main source of refrigeration, however additional cooling is affected by recompressing any gas contained in the tank. P. B. Tarman

Meter Standards

Webb, J. METER ECONOMY WITH STANDARDIZATION. *Amer. Gas Assoc.* Operating Section OS-56-1 (1956) October 15-17.

A summary of the history, objectives, and accomplishments of the Task Committee on Standardization of Meter Purchase Specifications. G. G. Wilson

Pipe Strength

Meredith, H. L. and Russell, B. R. IMPROVEMENT OF WELD JOINTS BY ROLL PLANISHING. *Eng. Digest* (British) *18*, 167-8 (1957) April; *Welding J. 36*, (2), 113-7 (1957) January.

Since roll planishing is relatively new in the field of light-metal fabrication the question arises as to effects of planishing on weld strength. Roll planishing has been found to increase the ultimate tensile strength and the field strength, to decrease slightly the elongation and to improve fatigue strength. G. Kunst

Pipelining

Hawkings, B. G. MECHANISATION—SOME EXPERIENCES IN ITS APPLICATION TO PIPELAYING AND MAINTENANCE. *Gas J.* (British), 294-99 (1957) February 6.

The applicability of mechanized equipment to the construction and maintenance of gas piping in Great Britain is discussed. The equipment includes trenches, back-hoes, tampers, mobile compressors, boring machinery, and mobile cranes. G. G. Wilson

Chapman, F. TORONTO—HUB OF EAST-

ERN CANADA'S NATURAL GAS INDUSTRY. *Gas 33,* 74-5, 78-80 (1957) March.

A report on the promotional activities of Consumer's Gas of Toronto which are aimed at producing a ready-made load for the Trans-Canada pipe line. G. G. Wilson

COMBINED DREDGING METHODS CUT CHANNEL. *Pipe Line News 29,* 30-32 (1957) March.

River crossing techniques on the Brazos, San Bernard and Colorado Rivers in S. Texas are described briefly. This is for the new 420-mile 30-inch line of the Texas Eastern Transmission Co., to bring in 115 million CF/day of Mexican gas for the Eastern Seaboard markets.
O. P. Brysch

EFFICIENT TRENCH BRACING SPEEDS PIPE LAYING. *Construction Methods 39,* 111, 114 (1957) March.

Unpredictable caving conditions in Miami, Florida, limerock in 15-ft. deep trenches for 90- and 96-inch sewer, are overcome by a well-organized sheet-piling crew and cranes. O. P. Brysch

FLORIDA LINE GETS NEW NOD. *Oil Gas J., 55,* 70 (1957) March 4.

Houston Texas Gas and Oil Corp. and Coastal Transmission Corp. have received approval on their new rate filings. The changes in proposed rate structure asked by the FPC are reviewed.
R. T. Ellington

REPORT ON 145-MILE PAKISTAN PIPELINE. *Pipe Line News 29,* 99 (1957) March.

With more than 50 miles of the 217-mile Sui-Multan line completed in West Pakistan, a new third pipeline located in East Pakistan—a 145-mile, 8-inch line from Sylhet to Dacca—has been surveyed for the government by the Sui Gas Transmission Co., Ltd. engineers. O. P. Brysch

Safety

Gaines, T. BLOWOUT PREVENTION. *Petroleum Eng. 29,* B-28, B-30 (1957) February.

The importance of establishment of a safe drilling plan, and training and equipping of the employees is emphasized as the principle items in the prevention of blow-outs. B. E. Eakin

Stormont, D. H. NEW SAFETY DEVICES REDUCE RIG ACCIDENTS. *Oil Gas J. 55,* 138, 42 (1957) February 18.

The operation of a hydraulic shock absorber and an electropneumatic device to minimize the crown accident hazards of oil field rig operations are described. G. G. Wilson

Telemetering

Nigh, M. T. DIGITAL TELEMETERING PROVES ACCURATE AND RELIABLE. *Pipe Line Ind. 6,* 45-56 (1957) March.

Service Pipe Line Company developed some new pipeline engineering ideas to transmit operating data and supervisory signals. Satellite station operation proves dependability of system.
Author's Abstract

Well Practise

Jahns, D. F. PRINCIPLES AND PRACTICES OF CEMENTING. *Petroleum Eng. 29,* B64, 66, 69, 70, 72, 74, 78, 80 (1957) March.

Casing and cementing operations constitute 20 to 30 percent of a well's cost. Good practices are essential to satisfactory completion and result in optimum production conditions throughout the operating life of the well. This is a detailed discussion of modern developments and techniques. O. P. Brysch

Well Practise Patents

Bond, D. C. and Cayre, A. T. (assigned to The Pure Oil Co.) TREATMENT OF SILICEOUS GEOLOGICAL FORMATIONS WITH FLUOPHOSPHORIC ACID. U.S. 2,785,752 (1957) March 19.

Clark, R. C. Jr., and Howard, G. C. (assigned to Stanolind Oil and Gas Co.) PLUGGING OFF WATER SANDS. U.S. 2,782,857 (1957) February 26.

Hughes, W. B. and Grady, G. O. (assigned to Cities Service Research and Development Co.) ACIDIZING WELLS. U.S. 2,784,788 (1957) March 12.

Matthews, C. S. and Killian, J. W. (assigned to Shell Development Co.) METHOD OF SUPPRESSING WATER AND GAS CONING IN OIL WELLS. U.S. 2,784,787 (1957) March 12.

Salathiel, R. A. (assigned to Esso Research and Eng. Co.) DRILLING MUDS. U.S. 2,785,125 (1957) March 12.

Scott, W. R. and Garner, B. L. (assigned to California Research Corp.) CORROSION INHIBITING METHOD AND COMPOSITION. U.S. 2,785,126 (1957) March 12.

Shock, D. A. and Sudburt, J. D. (assigned to Continental Oil Co.) OIL WELL INHIBITOR. U.S. 2,785,127 (1957) March 12.

Walstrom, J. E. (assigned to California Research Corp.) FORMATION TESTING APPARATUS. U.S. 2,784,786 (1957) March 12.

Well Tools Patents

Baker, R. C. (assigned to Baker Oil Tools, Inc.) APPARATUS FOR ANCHORING TUBING STRINGS IN WELL BORE CONDUITS. U.S. 2,785,758 (1957) March 19.

Boer, G., O'Reilly, W. M., and True, M. E. (assigned to Esso Research and Eng. Co.) WIRE LINE SETTING TOOL AND WELL PLUG. U.S. 2,784,790 (1957) March 12.

Boer, G., O'Reilly, W. M. and True, M. E. (assigned to Esso Research and Eng. Co.) WIRE LINE RELEASING TOOL AND WELL PLUG. U.S. 2,781,854 (1957) February 19.

Boer, G. and True, M. (assigned to Esso Research and Eng. Co.) SUBSURFACE BLOWOUT PREVENTER. U.S. 2,786,535 (1957) March 26.

Creighton, T. A. (assigned to V. N. and E. C. Creighton) FLOATING SUPPORT FOR WELL TUBINGS. U.S. 2,786,532 (1957) March 26.

En Dean, H. J. (assigned to Gulf Research and Development Co.) STORM CHOKE FOR OIL WELLS. U.S. 2,785,755 (1957) March 19.

Jamison, Jr., T. E. (assigned to Jones, W. T., Harding, R. L., Jamison, Sr., T. E., Sampson, M., Love, G. and Koehne, Jr., C. F.) DRILL STEM SUPPORTER AND STABILIZER. U.S. 2,783,028 (1957) February 26.

Maly, G. P. (assigned to Union Oil Co.) WELL PLUGGING PROCESS. U.S. 2,786,530 (1957) March 26.

Mangold, G. B., Dyer, J. A., and Hart, J. T. (assigned to Petroleum Eng. Assoc., Inc.) WELL COMPLETION WITH PERMEABLE CONCRETE. U.S. 2,786,531 (1957) March 26.

Middleton, W. H. PARAFFIN SCRAPER. U.S. 2,785,757 (1957) March 19.

Otis, H. C. (assigned to Continental Assurance Co.) WELL PACKER. U.S. 2,784,789 (1957) March 12.

Page, J. S., Jr. WELL TOOL. U.S. 2,786,534 (1957) March 26.

Pyle, E. C. and Pittman, F. C. (assigned to Halliburton Oil Well Cementing Co.) WELL BORE SCRAPING DEVICE. U.S. 2,781,100 (1957) February 12.

Reichertz, P. P., Sandberg, C. R., Connally, C. A., Jr. and Pollard, T. A. (assigned to Socony Mobil Oil Co. Inc.) GAS ANCHOR. U.S. 2,784,677 (1957) March 12.

Reynolds, J. M. WELL BAILERS. U.S. 2,785,756 (1957) March 19.

Rumble, R. C. (assigned to Esso Research and Eng. Co.) WELL PACKER. U.S. 2,781,852 (1957) February 19.

Rumble, R. C. and Peters, B. A. (assigned to Esso Research and Eng. Co.) PACKER FOR WELLS. U.S. 2,781,853 (1957) February 19.

Smith, G. A. (assigned to Shell Development Co.) WELL TUBING HEATER SYSTEM. U.S. 2,781,851 (1957) February 19.

Spearow, R. SINGLE PACKER OIL PRODUCTION METHOD. U.S. 2,785,753 (1957) March 19.

True, M. E. (assigned to Esso Research and Eng. Co.) PERMANENT WELL COMPLETION. U.S. 2,785,754 (1957) March 19.

Tausch, G. H. and Dublin, J. R. (assigned to Esso Research and Eng. Co.) APPARATUS FOR WELL WORKOVER OPERATIONS. U.S. 2,782,860 (1957) February 26.

Wise, F. N. (assigned to Esso Research and Eng. Co.) APPARATUS FOR INJECTING MATERIAL UNDER PRESSURE IN A WELL. U.S. 2,786,533 (1957) March 26.

6. PETROLEUM AND SYNTHETIC LIQUID FUELS

Catalysts

Addy, J. and Bond, G. C. CATALYSIS ON METALS OF GROUP 8. *Faraday Soc. Trans.* (British) *53*, 368-92 (1957) March. Reactions of cyclopropane, propane, propene, and propyl chlorides with hydrogen and deuterium were studied with respect to rates and hydrogen-deuterium distribution. Platinum metal catalysts and the mechanisms of hydrogenation are discussed. S. A. Weil

Haig, R. R. (Chmn.) CATALYTIC CRACKING PROBLEMS. *Petrol. Processing 12*, 78-81 (1957) February.

Some technical tips are given on the processing problems in catalytic cracking by a panel of various refining company authorities. The use and meaning of the CO_2 to CO ratio is the main topic. G. Kunst

Komarewsky, V. I. CATALYTIC PROPERTIES OF RARE EARTHS. *Ind. Eng. Chem. 49*, 264-6 (1957) February.

Because they are by-products of atomic piles and titanium production, rare earth elements may soon be abundant. They are promising as catalysts. Neodymium and samarium oxides, reported here, are predominantly alcohol dehydrogenating catalysts and their activity substantially improves with deposition on alumina. In their presence, n-heptane and l-octene can be cyclized and cyclohexane can be dehydrogenated to benzene. Author's Abstract

Exploration

Morrisey, N. S. MULTIBILLION-DOLLAR GAMBLE FACES LONG ODDS. *Oil Gas J. 55*, 215 (1957) February 18.

The oil industry has proposed a 3.6 billion dollar total budget for exploration and production in 1957 to improve some of the past downward trends in oil statistics. The national average exploratory success ratio has been fairly constant over the past 10 years, although there is a definite downward trend. The average successful well now finds only 120,000 bbl, compared to 168,200 bbl per well during the peak postwar years. The number of wildcat wells is increasing, and although there are more successful ones, the percentage of successes is decreasing and less oil is being obtained per foot of well drilled. The trend is toward deeper wells, with finding and developing costs up to $2 per bbl. Improvements in oil production have followed along the lines of geological pin-pointing (where large strata traps may occur), oil well fracturing, and better logging techniques. C. G. von Fredersdorff

Fluid Flow

Campbell, J. M. ELEMENTS OF FIELD PROCESSING—28: CALCULATING PRESSURE DROP. *Oil Gas J. 55*, 156-66 (1957) February 18.

A brief description of methods of calculating pressure loss. The use of Reynolds number friction-factor plots is illustrated and empirical formulas of the solution of water flow problems are presented. G. G. Wilson

Oil Prices

THE FACTS ABOUT OIL PRICES. *Pipe Line Ind. 6*, 3 (1957) March.

Since crude oil and gasoline prices were increased early this year, the American public has been subjected to a deluge of misleading statements about the oil industry and its operations. To help set the record straight, *Pipe Line Industry* is including as a supplement a collection of facts and figures that tell the true story. This information is not bound in the issue so that it can be read and passed to others outside the industry. Reprints are also available. Author's Abstract

Oil Properties

Cornelissen, J., Harva, O. and Waterman, H. I. DIE BESTIMMUNG DER ULTRASCHALLGESCHWINDIGKEIT IN GESAETTIGTEN MINERALOELFRAKTIONEN UND DEREN OBERFLAECHENSPANNUNG AUS DER KINEMATISCHEN VISCOSITAET UND DEM BRECHNUNGSINDEX. (THE DETERMINATION OF THE ULTRA SONIC VELOCITY IN SATURATED MINERAL OIL FRACTIONS AND THEIR SURFACE TENSION FROM THE KINEMATIC VISCOSITY AND THE INDEX OF REFRACTION.) *Erdoel und Kohle* (German) *10*, 80-82 (1957) February.

Compiled data of experimentally determined values of surface tension and ultrasonic velocity of saturated mineral-oil fractions of different origin are presented. G. Kunst

Nettesheim, G. MIKRODICHTEBESTIMMUNG FLUESSIGER KOHLENWASSERSTOFFE NACH EINER TROPEENSTEIGMETHODE. (MICRO-DENSITY DETERMINATION OF LIQUID HYDROCARBONS WITH A DROP RISING METHOD.) *Erdoel und Kohle* (German) *10*, 73-74 (1957) February.

Since the three available methods to determine densities of small amounts of hydrocarbons are applied with difficulty because two of them are extremely time-consuming and the third lacks suitable liquids for some determinations, a new method was developed where the time of rise of a drop is measured. G. Kunst

Schwebke, W. EIN VT-MONOGRAMM FUER DIE DYNAMISCHE UND DIE KINEMATISCHE VISCOSITAET VON MINERALOELEN IM TEMPERATURBEREICH 20° C. bis 150° C. (A VT-NOMOGRAM FOR THE DYNAMIC AND KINEMATIC VISCOSITY OF MINERAL OILS IN A TEMPERATURE RANGE OF 20° C. to 150° C.) *Erdoel und Kohle* (German) *10*, 75-79 (1957) February.

An extensive discussion of VT-nomograms and their equations from different origin together with new material is presented. G. Kunst

Oil Sands

WILL NEW METHOD UNLOCK FABULOUS OIL RESERVE? *Petroleum Eng. 29*, E-24-25, (1957) February.

A new combine, Can-Amera Oil Sands Ltd., will attempt to prove as economical a newly developed centrifugal process for recovering oil from the Athabasca oil sands of Northern Alberta. B. E. Eakin

Recovery Methods

Murphy, B., DON'T PRORATE WATER FLOODS. *Oil Gas J. 55*, 145, 46, 48 (1957) February 18.

It's been proved that greater ultimate recovery results from higher injection rates, and that oil is permanently lost if injection rates are reduced or if injection is stopped.

Author's Abstract

Squires, F., SECONDARY RECOVERY: EARLY AND LATE, *Petroleum Eng. 29*, B-80, 82, 84, 86, 88, 91, 92, 96, B-98 (1957) February.

The various techniques utilized by the petroleum industry in their search for a method of total recovery are reviewed, with emphasis on in-situ heating methods. B. E. Eakin

Torrey, P. D., WATER IN THE PRODUCTION OF OIL. *Petrol. Eng. 29*, B-83 - B-86, B-88, B-92, B-94, B-96, B-98 (1957) January.

The procurement, transportation and treatment of water for use in the oil industry represents an increasingly difficult problem. It is estimated that ultimate total of 5.5 trillion gallons of water will be required in Texas alone for secondary recovery and pressure maintenance projects. B. E. Eakin

PRESSURE MAINTENANCE IN THE GOLDSMITH FIELD. *Petrolm. Eng. 29*, B-28-32 (1957) January.

Water injected into the peripheral wells of the Goldsmith Field reacts favorably with the San Andres dolomite, making Gulf Oil's West Texas field a success. Gas is also injected into the gas cap. B. E. Eakin

Reservoir Engineering

Marsal, D. DIE BERECHNUNG DER VERWAESSERUNG VON ERDOELLAGERSTAETTEN IN EINDIMENSIONALER NAEHERUNG. 2. Teil: DIE UEBERTRAGUNG DER IM LABORATORIUM GEWONNENEN BEZIEHUNGEN AUF DAS FELD. (COMPUTATION OF WATER ENCROACHMENT OF OIL WELLS IN A ONE-DIMENSIONAL APPROXIMATION. Part 2: THE TRANSFER OF THE LABORATORY OBTAINED RELATIONSHIPS TO THE FIELD.) *Erdoel und Kohle* (German) *10*, 141-6 (1957) March.

The erection of surfaces of equal oil saturation in the formation and the geometric influence of formation thickness and its slope as well as the selective encroachment is discussed in detail. G. Kunst

Polumbus, E. A. Jr., EVALUATING AN OIL PROPERTY. *Oil Gas J. 55*, 97-100 (1957) January 21.

A fundamental treatment of the methods of developing the data required to evaluate an oil property. This part is concerned with the determination of the oil reserve by consideration

of such factors as reservoir rock characteristics, type of oil accumulation, the characteristics of the reservoir fluid, and the type of energy drive mechanism. G. G. Wilson

Solvent Drive

Hall, H. H., Geffen, T. M. A LABORATORY STUDY OF SOLVENT FLOODING. *J. Petrol. Tech. 9,* 48-57 (T. P. 4456) (1957) February.

In contrast to thorough gas driving or waterflooding, essentially all oil contacted can be recovered by flooding with a solvent. A practical method would be to inject a small bank of solvent to displace the oil. This solvent bank in turn could be driven through the rock by natural gas, also miscible with the solvent. Such a method of oil recovery was studied in the laboratory using long (up to 94 ft.) core systems. It was found that, as the solvent moves the front end of the bank becomes mixed with the oil in a relatively short mixing zone. Displacement of the solvent by natural gas can be achieved with complete miscibility (above the critical pressure or with partial miscibility at lower pressures. Two plans are suggested for application. Calculations based on the laboratory tests indicated that a bank of solvent with a volume of less than 10 per cent of the hydrocarbon volume will obtain high oil recovery. Author's Abstract

Jenks, L. H., Campbell, J. B. and Binder, G. G., Jr. A FIELD TEST OF THE GAS-DRIVEN LIQUID PROPANE METHOD OF OIL RECOVERY. *J. Petrol. Tech. 9,* 34-39 (T. P. 4457) (1957) February.

Conventional methods of producing crude oil generally leave in the depleted reservoir 1 to 3 bbl of oil for every barrel brought to the surface. A field test explored using gas-driven liquid propane to improve oil recovery in the C-2 Block leases of the Seminole City pool, Seminole County, Okla. by The Carter Oil Co. Laboratory studies indicated low residual oil by using limited amounts of propane driven by gas. The field test involved 1) repressuring the reservoir, 2) injecting the liquid propane, and 3) injecting dry natural gas to drive to producing wells. Oil production rates averaged about nine times the final primary rates. The field average GOR is still below the pre-test value. Oil recovery to date is 112,000 STB. One-third of the 143,000 bbl of propane injected has been produced. Authors' Abstract

Koch, H. A., Jr. and Slobod, R. L. MISCIBLE SLUG PROCESS. *J. Petrol. Tech. 9,* 40-47 (T. P. 4458) (1957) February.

This new miscible slug process involves the injection of propane or LPG into the reservoir prior to gas injection. The slug is miscible with both the reservoir oil and the injected gas phase. Thus a displacement is achieved, and high recoveries are obtained. The striking discovery of the laboratory study by the Atlantic Refining Co. was that small slugs of LPG are effective over reservoir distances. Factors controlling the size of the slug are: 1) reservoir length. 2) reservoir fluid composition, and 3) reservoir pressure at the displacement front. Of lesser importance are the effects of injection rate and porous medium type.

Authors' Abstract

Storage Caverns

Herzog, G., and Stelzer, R. B. (assigned to Texas Co.) METHOD FOR FORMING AND SURVEYING A CAVERN IN A SALT FORMATION. U. S. 2,786,661 (1957) March 26.

The present invention relates to an electrical method for determining the size and shape of a cavity for the purpose of storing petroleum products. G. Kunst

Transportation

Capdeville, J. B. THE LE HAVRE-PARIS PIPELINE. *J. Inst. Petroleum 43,* 1-13 (1957) January.

To satisfy the Paris postwar demand for refined products a ten-inch pipeline was designed to transport a maximum of 2,200,000 metric tons per year to this growing industrial area. Details of the pipeline such as corrosion inhibition, metering, pumping and controls are included. A short economic study is also presented. P. B. Tarman

The following article, the abstract for which appears on the page indicated, is also called to your attention:

Uren, L. C. PETROLEUM PRODUCTION ENGINEERING p. 124

7. ANALYTICAL METHODS AND TESTS

Gas Chromatography

Greene, S. A. and Roy, H. E. EFFECT OF DIFFERENT CARRIER GASES ON RETENTION TIMES IN GAS-ADSORPTION CHROMATOGRAPHY. *Anal. Chem. 29,* 569-70 (1957) April.

Retention times of eluted gases are markedly affected by different carrier gases on the same column. Carrier gases which are adsorbed to some extent reduce the retention time.

Authors' Abstract

Voss, G. and Hessenauer, F. THE CHROMATOGRAPHIE VON GASEN UND DAEMPFEN. (CHROMATOGRAPHY OF GASES AND VAPORS). *Erdoel und Kohl* (German) *10,* 161-3 (1957) March.

The separation process described here is excellent in its simplicity of operation, fast performance, accuracy and its possibilities for variation. Consequently this method has gained in importance and can be considered as equivalent to mass- and infrared-spectrometry.

G. Kunst

Renzetti, N. A. ANALYSIS OF AIR NEAR HEAVY TRAFFIC ARTERIES. Air Pollution Foundation, Report No. 16. Los Angeles: The Foundtn., 1956, December.

This work describes the infrared spectrometry survey for determining the range of concentration of the major constituents of automobile exhaust in the vicinity of heavy traffic in the Los Angeles area. E. Mann

Infrared Technique

Hausdorff, H. H. APPLICATIONS OF INFRARED SPECTROSCOPY. *Chem. and Ind.* (British), No. 6, 154-58 (1957) February 9.

Brief discussion of the two types of continuous infrared analyzers available and of several places they can be utilized in industry for checking gas stream product and reaction.

E. Mann

Moisture Meter

Pawlin, J. and Spinks, J. W. T. NEUTRON MOISTURE METER FOR CONCRETE. Can. J. Technol. *34,* 503-513 (1957) March.

A portable moisture meter which will give rapid and non-destructive measurement of a concrete member was designed and built. A Ra-Be neutron source was used with a BF_3 chamber as a detector. P. V. Burket

Naphthalene and Benzene

Moulson, I. THE DETERMINATION OF NAPHTHALENE AND BENZOLE IN COKE-OVEN GAS. *Gas World* (British) *145,* Coking Sect. 54-6, 58, 60 (1957) March 2; 80, 82, 84 (1957) April 6.

The picrate method of naphthalene determination, as modified by the British Coke Research Association and the Ruhrgas (German) laboratories, is described and the results are compared. A method for benzole in gas, employing an improved freezing condenser, is also described. O. P. Brysch

Organic Test Papers

Lambert, J. L. and Cates, V. E. POLYANION-STABILIZED DIAZONIUM CATIONS AND DIAZONIUM SPOT TEST PAPERS AS ANALYTICAL REAGENTS. *Anal. Chem. 29,* 508-02 (1957) April.

Diazonium cations can be stored for long periods in the dark on a dry nuclear sulfonic acid ion exchange resin. They can be removed as needed by ion exchange for use as a qualitative and quantitative analytical reagent for determination of certain aromatic compounds. The diazonium ion of p-arsanilic acid, bound to filter paper as the zirconium salt, is described as a spot test reagent for phenols and amines.

Authors' Abstract

Phosphorimetry

Keirs, R. J., Britt, R. D., Jr. and Wentworth, W. E. PHOSPHORIMETRY A NEW METHOD OF ANALYSIS. *Anal. Chem. 29,* 202-09 (1957) February.

A discussion of what phosphorimetry is and of the conditions necessary for obtaining phosphorescence. Analysis of 3 organic mixtures using this method of analysis are given and discussed. The average relative error on known concentrations is about 10%. R. R. Amrine

Sulfate Titration

Kenny, F., Kurtz, R. B., Beck, I., and Lukosevicius, I. VOLUMETRIC DETERMINATION OF SULFATE BY TITRATION OF EXCESS LEAD NITRATE WITH POTAS-

SIUM CHROMATE USING SILOXENE INDICATOR. *Anal. Chem. 29,* 543-6 (1957) April.

Sulfate in solution can be determined accurately by the addition of a measured amount (an excess) of standard lead nitrate solution followed by titration of the excess with potassium chromate. Titration is made in a dark chamber and light emitted by the siloxene indicator at the end point is measured by a multiplier photometer. Authors' Abstract

Tar Composition

Gundermann, E. ZUR FRAGE DER ZERLEGUNG EINES BRAUNKOHLENTEER-PARAFFINOELS MIT SELEKTIVEN LOESUNGSMITTELN. (ABOUT THE QUESTION OF THE DECOMPOSITION OF A LIGNITE-COAL-TAR PARAFFIN OIL WITH SELECTIVE SOLVENTS.) *Erdoel und Kohle* (German) *10,* 151-7 (1957) March.

Data are presented and discussed about the decomposition of paraffin oil with methanol and its mixtures with various solvents as extractants. G. Kunst

X-Ray Method

Gunn, E. L. FLUORESCENT X-RAY SPECTRAL ANALYSIS OF POWDERED SOLIDS BY MATRIX DILUTION. *Anal. Chem. 29,* 184-89 (1957) February.

The coefficient of variation for 11 elements (between atomic numbers 20 and 42) in briquetted pellets, using a 1:1 cornstarch-lithium carbonate mixture for matrix dilution, is approximately 3%. The average analysis value, with the concentration of the elements between 4% and 16% in synthetic samples, varies from synthesis by about 10%.

R. R. Amrine

8. GENERAL AND PHYSICAL CHEMISTRY

Acetylene Properties

Coats, F. H. and Anderson, R. C. THERMODYNAMIC DATA FROM ELECTRON-IMPACT MEASUREMENTS ON ACETYLENE AND SUBSTITUTED ACETYLENES. *J. Amer. Chem. Soc. 79,* 1340-44 (1957) March 20.

Earlier measurements of electron-impact data for propyne and 2-butyne have been extended to other substituted acetylenes: 1-butyne, diacetylene, 1-Br-1-propyne, 1-Cl-1-propyne and phenoxyacetylene. From these the heat of formation of C_2H was determined to be 112 kcal./mole. Authors' Abstract

Adsorption

Freund, T. DIFFUSION AND GAS SORPTION RATES OBEYING THE ELOVICH EQUATION. *J. Chem. Physics 26,* 713 (1957) March.

The rates of gas sorption on porous solids have recently been correlated using the Elovich equation. The author hopes in the future to be able to determine experimentally the factors involved which determine the rate of sorption when corrected for Knudsen diffusion. G. Kunst

Higuchi, I., Ree, T. and Eyring, H. ADSORPTION KINETICS. II. NATURE OF THE ADSORPTION BOND. *J. Amer. Chem. Soc. 79,* 1330-37 (1957) March 20.

The bonds involved in chemisorption, particularly on metals, are treated by methods of quantum mechanics. The method was applied to the systems Ba on W, Sr on W, and the diatomic gases (H_2, O_2, N_2, CO) on metals (W, Ni, Fe, Ta, Rh, Cr, Cu, Pt) with a comparison of calculated and observed heats of desorption.

D. M. Mason

Alpha Particles

Harvey, B. G., Jackson, H. G., Eastwood, T. A. and Hanna, G. C. THE ENERGY OF ALPHA PARTICLES FROM U^{234}, U^{238}, AND Th^{232} *Can. J. Physics 35,* 258-270 (1957) March.

The α particle energies of U^{234}, U^{238}, and Th^{232} have been measured using a grid ionization chamber. P. V. Burket

CO_2 Properties

Price, D. JOULE-THOMSON COEFFICIENT, ISOCHORIC HEAT CAPACITY, AND ISENTROPIC BEHAVIOR AT 100° TO 1000° AND 50 TO 1400 BARS. *Ind. Eng. Chem. Data Series 1,* 83-86 (1956) November.

The data for the thermodynamic function of carbon dioxide listed in the title are presented in tabular form. B. E. Eakin

Cloud Chamber

Madonna, L. A. THE DESIGN AND OPERATION OF A CLOUD CHAMBER. *Can. J. Tech. 34,* 485-494 (1957) March.

A design for a cloud chamber to give homogeneous nucleation and growth of water droplets.
P. V. Burket

Compressibility

Evans, R. B. and Watson, G. M. COMPRESSIBILITY FACTORS OF NITROGEN— n-BUTANE MIXTURES IN THE GAS PHASE. *Ind. Eng. Chem. Data Series 1,* 67-71 (1956) November.

Gas phase pressure-volume-temperature data are reported for 5 nitrogen—*n*-butane mixtures of 310°, 340°, 370°, and 400°F, and for pressures from 200 to 10,000 psi. Results are presented in graphical and tabular form.
B. E. Eakin

Diffusion

Ramser, J. H. THEORY OF THERMAL DIFFUSION UNDER LINEAR FLUID SHEAR. *Ind. Eng. Chem. 49,* 155-58 (1957) January.

In this discussion the mathematical theory for a plane-parallel thermal diffusion column is developed, in which the velocity distribution is linear. The mathematical treatment is based on the work of Debye. B. E. Eakin

Sullivan, L. J., Ruppel, R. C., and Willingham, C. B. PACKED THERMAL DIFFUSION COLUMNS—EFFECT OF CHANGES IN ANNULAR SPACING AND PACKING DENSITY. *Ind. Eng. Chem. 49,* 110-13 (1957) January.

The effect of changes in annular spacing and packing density on the batch separation of organic liquids was studied in a Clusius-Dickel parallel-wall instrument. A complex relationship was established between percentage separation, annular spacing, and packing density.
B. E. Eakin

Equation of State

Pings, C. J., Jr., and Sage, B. H. BENEDICT EQUATION OF STATE METHANE—*n*-PENTANE SYSTEM. *Ind. Eng. Chem. Data Series 1,* 56-62 (1956) November.

Coefficients of the Benedict equation of state were determined by least squares techniques from experimental data for six methane—*n*-pentane mixtures, at pressures up to 5000 psi and temperatures from 100° to 460°F. The accuracy of representation of the data by the equation was increased by severalfold over that obtained by use of Benedict's techniques for mixtures. B. E. Eakin

Heat Capacity

Weiss, A. H. and Joffe, J. GENERALIZED CORRELATION FOR EFFECT OF PRESSUR ON ISOBARIC HEAT CAPACITY OF GASES. *Ind. Eng. Chem. 49,* 120-24 (1957) January.

The Benedict-Webb-Rubin equation of state was substituted into the well-known thermodynamic equations from which a relationship for the effect of pressure on the isobaric heat capacity of gases could be calculated. The generalized correlation was based on the calculated C_p values for methane, ethylene, ethane-propane, and *n*-butane. B. E. Eakin

Kinetics

Montroll, E. W. and Shuler, K. E. STUDIES IN NONEQUILIBRIUM RATE PROCESSES. I. THE RELAXATION OF A SYSTEM OF HARMONIC OSCILLATORS. *J. Chem. Physics 26,* 454-64 (1957) March.

As part of an investigation of nonequilibrium phenomena in chemical kinetics a theoretical study has been made, and an exact solution for the general equation has been obtained for the collisional and radioactive relaxation of a system of harmonic oscillators. G. Kunst

Molecular Scattering

Mason, E. A. SCATTERING OF LOW VELOCITY MOLECULAR BEAMS IN GASES. *J. Chem. Physics 26,* 667-77 (1957) March.

A large number of partial and total molecular scattering cross sections have been calculated numerically by classical methods. The tabulations can be used to obtain information about intermolecular forces from the results of experiments on the scattering of low velocity molecular beams in gases. G. Kunst

Phase Equilibria

Evans, R. B. and Harris, D. HYDROCARBON MIXTURE CONTAINING TWO CONCENTRATIONS OF HEPTANES AND HEAVIER FRACTION. *Ind. Eng. Chem. Data Series 1,* 45-50 (1956) November.

Equilibrium vaporization ratios are reported for the components, methane through heptanes-plus, for two combined natural gas-crude oil mixtures. The heptanes-plus fraction of the two mixtures was 20.13 and 11.20 mole%, with the relative amounts of the other components

held constant. The data were obtained at 190°F and cover a range of pressures from 1000 to 6000 psia. B. E. Eakin

Kobe, K. A., Ravicz, A. E., and Vohra, S. P. CRITICAL PROPERTIES AND VAPOR PRESSURES OF SOME ETHERS AND HETEROCYCLIC COMPOUNDS. *Ind. Eng. Chem. Data Series 1*, 50-56 (1956) November.

This report supplies data on the critical properties of 5 ethers and 8 heterocyclic compounds, and presents correlations and equations for calculating the critical temperatures and pressures of the ethers, heterocyclic compounds, and ketones. B. E. Eakin

Opell, J. B. and Sage, B. H. BENEDICT EQUATION OF STATE, APPLICATION TO *n*-HEXANE, *n*-HEPTANE, *n*-NONANE, AND *n*-DECANE. *Ind. Eng. Chem. Data Series 1*, 62-66 (1956) November.

The coefficients for *n*-hexane, *n*-heptane, *n*-nonane, and *n*-decane were evaluated by statistical techniques, and the constants and their representation of the experimental data are reported. B. E. Eakin

Reamer, H. H., Corcoran, W. H., and Sage, B. H. VOLUMETRIC AND PHASE BEHAVIOR IN THE NITRIC ACID-NITROGEN DIOXIDE-WATER SYSTEM. *Ind. Eng. Chem. Data Series 1*, 24-29 (1956) November.

Pressure-volume-temperature data are reported for three mixtures of nitric acid, nitrogen dioxide, and water at physical and chemical equilibrium were made at temperatures between 190° and 340°F and at pressures up to 5000 psia. B. E. Eakin

Reamer, H. H. and Sage, B. H. DIFFUSION COEFFICIENTS METHANE—*n*-BUTANE—METHANE IN LIQUID PHASE. *Ind. Eng. Chem. Data Series 1*, 71-77 (1956) November.

The Fick diffusion coefficient of methane in the liquid phase of the methane—*n*-butane system is reported for pressures up to 2000 psi and temperatures from 10° to 220°F. It was determined that the composition and temperature of the liquid phase have a significant influence on the diffusion coefficient. B. E. Eakin

Reamer, H. H., Sage, B. H., and Lacey, W. N. VOLUMETRIC AND PHASE BEHAVIOR OF THE METHANE — *n*-HEPTANE SYSTEM. *Ind. Eng. Chem., Data Series 1*, 29-42 (1956) November.

Data on the molal volume and equilibrium composition of the vapor and liquid phases are reported for four mixtures of methane and *n*-heptane at pressures up to 10,000 psi and temperatures from 40° to 460°F. The results are presented in tabular and graphical form. B. E. Eakin

Solubility

Dodds, W. S., Stutzman, L. F., and Sollami, B. J. CARBON DIOXIDE SOLUBILITY IN WATER. *Ind. Eng.Chem. Data Series 1*, 92-95 (1956) November.

All available data on the solubility of carbon dioxide in water have been assembled, converted to a uniform basis, and presented in graphical form for pressures up to 700 atmospheres and temperatures from 0° to 125°C. B. E. Eakin

Suspension Reactions

Browning, J. A., Tyler, T. L., and Krall, W. G. EFFECT OF PARTICLE SIZE ON COMBUSTION OF UNIFORM SUSPENSIONS. *Ind. Eng. Chem. 49*, 142-47 (1957) January.

This report presents data on a region omitted by previous investigations, and indicates that better particle-size control may make it possible to extend the lean limits of stable spray combustion. B. E. Eakin

Dotson, J. A., Koehler, W. A., Holden, J. H. RATE OF THE STEAM-CARBON REACTION BY A FALLING-PARTICLE METHOD. *Ind. Eng. Chem. 49*, 148-54 (1957) January.

Experimental data is reported on studies of the gasification of petroleum coke and electrode graphite at temperatures from 1800° to 2500°F, for carbon particles smaller than 200 mesh entrained in a steam atmosphere, and for carbon in stoichiometric deficiency with steam. B. E. Eakin

Vapor Pressures

Othmer, D. F., Maurer, P. W., Molinary, C. J. and Kowalski, R. C. CORRELATING VAPOR PRESSURES AND OTHER PHYSICAL PROPERTIES. *Ind. Eng. Chem. 49*, 125-37 (1957) January.

A general equation and nomogram have been

developed for conveniently correlating vapor pressures, latent heats, and such other physical properties as may be correlated as straight line functions on a logarithmic plot with temperature scale derived from the vapor pressure of water. Vapor pressure data for use with the nomogram are given for some 600 substances.

B. E. Eakin

9. ORGANIC CHEMISTRY AND PETROCHEMICALS

Coordination Compounds

Helmkamp, G. K., Carter, F. L. and Lucas, H. J. COORDINATION OF SILVER ION WITH UNSATURATED COMPOUNDS. VIII. ALKYNES. *J. Amer. Chem. Soc. 79,* 1306-10 (1957) March 20.

Quasi thermodynamic equilibrium constants, K_a, of the reactions of aqueous silver nitrate with a number of alkynes have been determined by solubility measurements at ionic strength $\mu = 1$ and in the absence of oxygen.

Authors' Abstract

Jonassen, H. B. and Field, J. E. OLEFIN COORDINATION COMPOUNDS. II. THE PREPARATION AND INFRARED SPECTRAL PROPERTIES OF OLEFIN — PLATINUM (II) CHLORIDE COMPLEXES. *J. Amer. Chem. Soc. 79,* 1275-76 (1957) March 20.

Slade, Jr., P. E. and Jonassen, H. B. OLEFIN COORDINATION COMPOUNDS. III. COORDINATION COMPOUNDS OF BUTADIENE WITH PLATINUM (II), PALLADIUM (II) AND COPPER (I) HALIDES. *J. Amer. Chem. Soc. 79,* 1277-79 (1957) March 20.

Jonassen, H. B. and Kirsch, W. B. OLEFIN COORDINATION COMPOUNDS. IV. PLATINUM (II) COMPLEXES WITH CIS- AND TRANS-2-BUTENE. *J. Amer. Chem. Soc. 79,* 1279-81 (1957) March 20.

Diene Autoxidation

Kawahara, F. K. AUTOXIDATION OF 2, 3-DIMETHYLBUTADIENE-1, 3. *J. Amer. Chem. Soc. 79,* 1447-50 (1957) March 20.

The products of this reaction were investigated as an aid to the understanding of gum formation in gasoline.

D. M. Mason

Hydrogenation

Motard, R. L., Burke, R. F., Canjar, L. N. and Beckmann, R. B. THE KINETICS OF THE CATALYTIC HYDROGENATION OF BENZENE ON SUPPORTED NICKEL AND NICKEL OXIDE CATALYSTS. *J. Appl. Chem.* (British) *7,* 1-14 (1957) January.

Benzene was hydrogenated to cyclohexane in a fluidized reactor using nickel and nickel oxide on silica gel at 150°-275°C and 25-100 psig. Kinetics of the reaction were studied and the data were correlated with a rate equation developed from a dual-site mechanism.

E. B. Shultz

10. CHEMICAL ENGINEERING

Boiler Water

Resen, L. HOW GULF PURIFIES ITS BOILER WATER. *Oil Gas J. 55,* 106-10 (1957) February 11.

An ion-exchange demineralization plant is being used at the Gulf Oil Corp. Port Arthur, Texas refinery to prepare high-quality water for use as high-pressure boiler feed. Principles, method of operation, and materials of construction are described.

D. M. Mason

Fluidization

Handlos, A. E., Kuntsman, R. W., and Schissler, D. O. USE OF TRACERS IN REFINERY STUDIES,—GAS MIXING CHARACTERISTICS OF A FLUID BED REGENERATOR. *Ind. Eng. Chem. 49,* 25-30 (1957) January.

This article reports on the use of helium as a tracer in determining the effectiveness of mixing of the solid and fluid particles in catalyst regeneration studies. Data indicate good mixing near the center, with less effective mixing near the walls of the vessel.

B. E. Eakin

Fractionation

Hutchinson, M. H., Baddour, R. F. RIPPLE TRAYS: A NEW TOOL FOR VAPOR-LIQUID CONTACTING. *Petroleum Eng. 29,* C6-C9 (1957) February.

Higher capacity, insensitivity to load changes, and lower costs are claimed for this latest development in fractionating equipment.

B. E. Eakin

Gas Fractionation

LOW TEMPERATURE GAS SEPARATION PLANTS: BUILT AND DESIGNED IN CANADA FOR U. S. INDUSTRIES. *Can. Chem. Proc. 41,* 46-48 (1957) April.

Among important products exported from Canada to U. S. are low-temperature gas-separation liquefaction plants designed and built by L'Air Liquide in Montreal, Que. The principle behind these plants is the extremely low temperature liquefaction of gases and their subsequent separation by distillation. This can be applied to gaseous mixtures other than those present in atmosphere; namely natural gas, refinery off-gases, coke oven gas (to separate hydrogen CO, CH_4, propane and nitrogen). Although used for many years in Europe, the full potentiality of these techniques has been realized in North America only in the past decade.
G. Kunst

Gas Processing

Hanisian, J. and Warburton, J. (assigned to M. W. Kellogg Co.) SEPARATION OF STEAM AND HYDROCARBONS. U.S. 2,786,802 (1957) March 26.

McKinley, J. B. and Derrig, M. J. (assigned to Gulf Research and Development Co.) FLUID CONTACTING PROCESS INVOLVING FLUIDIZED PARTICLES. U.S. 2,786,801 (1957) March 26.

Heat Transfer

Hirschfelder, J. O. HEAT TRANSFER IN CHEMICALLY REACTING MIXTURES. I. *J. Chem. Phys. 26,* 274-81 (1957) February.

A simple equation is given for the effective coefficient of thermal conductivity of a chemically reacting mixture, where the overall heat flux depends upon the rates of both the homogeneous reaction in the gas phase and the heterogeneous reaction on a plate surface. Detailed examples are given for a unimolecular rearrangement and for the dissociation of oxygen. The analysis applies equally well to liquid and gaseous mixtures. G. Kunst

Hirschfelder, J. O. HEAT CONDUCTIVITY IN POLYATOMIC OR ELECTRONICALLY EXCITED GASES. II. *J. Chem. Phys. 26,* 282-285 (1957) February.

The usual Eucken equation for the heat conductivity of a molecule with internal degrees of freedom is derived and improved. G. Kunst

Lundgren, C. E. and Seippel, C. THERMAL PROBLEMS OF ATOMIC POWER STATIONS. *Combustion 28,* 51-58 (1957) February.

Since nuclear reactors for power generation are limited to a much lower temperature operation compared to conventional fuel-fired plants, considerable care must be given to the improvement in efficiency of nuclear power steam cycles. This requires that all the heat transfer processes are conducted as near as possible to the maximum temperature of the nuclear reactor. This would insure the minimum irreversibility in heat transfer and provide a maximum approach of the actual cycle to the ideal Carnot efficiency. Maximum feedwater heating would be desirable. Some methods of approach in improving the overall efficiency include multipoint bleeding of condensate from the steam turbine, adjustment of flow in heat exchangers to insure a minimum temperature differential between heat exchanging streams, the use of staggered steam pressures, and the use of turbine reheat. Results of calculations are given.
C. G. von Fredersdorff

Witzell, O. W. and Fontaine, W. E. WHAT ARE THE HEAT TRANSFER CHARACTERISTICS OF WIRE AND TUBE CONDENSERS? *Refrig. Eng. 65,* 33-37 (1957) March.

The four parameters that affect design and the total heat transferred from wire and tube condensers were studied, namely, wire diameter, total wire length, tube diameter and its total length. G. Kunst

Lube Properties

Kalichevsky, V. A. LUBRICATING OILS: PROPERTIES AND APPLICATIONS. *Petroleum Eng. 29,* C14-17 (1957) January.

The viscosity, viscosity index, congealing characteristics, oiliness, stability and other physical properties are discussed, with their influence on the behavior of lubricating oils in various applications. B. E. Eakin

Process Control

AUTOMATIC PROCESS CONTROL . . . HOW AND WHY. *Oil Gas J. 55,* 123-36 (1957) February 18.

Process control is generally discussed. Propor-

tional, reset, and rate controller actions are explained, and final control elements are mentioned. W. G. Bair

Reactors

Meyer, R. SKY-HIGH PROCESS PRESSURES DEMAND MASSIVE VESSELS. *Petroleum Eng. 29*, C6-11 (1957) January.

Recent developments in the design and fabrication of large industrial equipment to operate at pressures exceeding 10,000 psi are discussed, with pictures of several interesting vessels and heat exchangers. B. E. Eakin

Reactor Fuel Reprocessing

Benedict, M. and Pigford, T. H. FUEL CYCLES IN SINGLE REGION THERMAL REACTORS. *Chem. Eng. Progress 53*, 96F-104 (1957) February.

Mathematical relationships are presented for calculating the operation of a nuclear reactor and for computing the conditions under which a fuel reprocessing plant should operate. Results are given for a uranium-plutonium nonrecycle unmixed fuel system and a plutonium recycle unmixed fuel system.
C. G. von Fredersdorff

Lawrowski, S. and Rodger, W. A. NEW PROCESSES PROMISE MORE ECONOMIC FISSION PRODUCT REMOVAL. *Chem. Eng. Progress 53*, 70F-71 (1957) February.

Under the present status of reactor technology, the operation of a nuclear reactor is interrupted after only a small fraction of the nuclear fuel is consumed. The fuel elements then have to be reprocessed for one or more of the following reasons: 1) to remove fission-product poisons and add fissionable material; 2) to restore the heat transfer and structural properties of solid fuel, and 3) to recover bred fissionable material. A large number of reprocessing cycles is required to recover essentially all of the fissionable material. A more economical reprocessing cycle than the presently solvent extraction method appears to be the fluoride volatility process, which employs fractional distillation of the hexafluorides to achieve a high degree of decontamination and separation of plutonium from uranium. The ultimate in simplification of fuel reprocessing is represented by the molten metal or pyrometallurgical method, also under study and development.
C. G. von Fredersdorff

11. PROCESS EQUIPMENT AND INSTRUMENTATION

Computers

Patterson, D. W. USING ELECTRONIC COMPUTERS IN THE OIL INDUSTRY 4. WHAT SCIENTIFIC DATA REDUCTION INCLUDES. *Oil Gas J. 55*, 175-76 (1957) February 18.

A very brief discussion of data reduction which includes a plot of the relative costs of data reduction by manual, semiautomatic and automatic means, as a function of the number of data points involved. G. G. Wilson

Rose, A., Accliarri, J. A., Johnson, R. C., and Sanders, W. W. AUTOMATIC COMPUTATION OF ANTOINE EQUATION CONSTANTS — CAPROIC AND CAPRYLIC ACIDS AND METHYL ESTERS. *Ind. Eng. Chem. 49*, 104-09 (1957) January.

An electronic digital computer can be programmed to automatically evaluate Antoine equation constants for any substance, if the vapor pressure-temperature data are available. The program procedure is presented in detail, and results obtained are summarized.
B. E. Eakin

Brooks, R. W. LOGICAL DESIGN WITH SYMBOLIC LOGIC. *Instruments and Automation 30*, 457-463 (1957) March.

An introduction to symbolic logic and binary members is presented with their uses in the design of digital computer components.
J. E. Neuzil

Klein, M. L., Williams, F. K. and Morgan, H. C. DIGITAL COMPUTERS. *Instruments and Automation 30*, 449-456 (1957) March.

A description is given of the four basic elements of digital computers with an introduction to the techniques of basic digital computer operations of addition, subtraction and multiplication. J. E. Neuzil

Control Costs

Thomas, E. I. COST OF PNEUMATIC CONTROL SYSTEMS. *Instruments and Automa-*

tion 30, 464-469 (1957) March.

This article gives a detailed cost study of a complete control-instrument system.

J. E. Neuzil

Furnace Erosion Control

MEASUREMENT OF MELT LEVEL AND ITS CONTROL WITH RADIO ISOTOPES. *Ceramics* (British) *9,* 12, 13 (1957) March 3; *Email-Keramo-Techn. 7,* 182 (1956) No. 5.

Severe wear of glass-tank walls by fluctuating levels of the molten glass charge is successfully controlled by radio isotopes cobalt 60 and caesium 137. These gamma-ray emitters, sighted across the tank to a Geiger counter receiver, give a reduction in received radiation when below the melt level, which variation can be used to actuate an alarm, or an automatic feeder. O. P. Brysch

Heating Element

KANTHAL-SUPER, A NEW FURNACE ELECTRODE FROM SWEDEN. *Ceramics* (British) *9,* 14-17, 19 (1957) March.

A new cermet-type resistance material, composed chiefly of MoSi and SiO_2 (Swedish Pat. 153, 961, Feb. 26, 1957) is now powder-pressed into rods to form furnace heating elements. Temperatures of 1600°C (2900°F) at continuous operation are claimed. Properties, electrical characteristics, furnace design and atmospheres are outlined. O. P. Brysch

Instruments

Linford, A. MEASUREMENT AND CONTROL BY ELECTRONICS. *Coke and Gas* (British) *19,* 58-62, February; 108-11, 118 (1957) March.

Principles and practice of electronics are discussed with reference to applications in the gas industry. Electron valves are described first in some detail. D. C. amplifiers, transistors, photocells and their application as amplifiers of measured input in humidity, pressure, pH, temperature and smoke measurement are discussed briefly with respect to automatic control. O. P. Brysch

Maintenance

Monack, M. L., Shockley, H. W., Allen, J. R. NEW WAYS TO REDUCE PAINTING COSTS, *Petrol. Refiner 36,* 125-28 (1957) January.

A concise description of the manner in which hot spray application, designing for minimum exposed surface, the use of high solids content paints, and the auxiliary use of plastic tapes can minimize painting costs. G. G. Wilson

Roberts, K. S. EXPANSION JOINTS HOW TO SELECT AND MAINTAIN THEM. *Petrol. Refiner 36,* 155-60 (1957) January.

A brief, illustrated guide to the utilization of expansion joints which includes a chart for the determination of the expansion of steel pipe carrying steam at various temperatures and pressures. G. G. Wilson

Taylor, P. WAYS TO IMPROVE INSTRUMENT MAINTENANCE. *Petrol. Refiner 36,* 171-173 (1957) January.

This brief article is concerned with the organization of an effective instrument control program. G. G. Wilson

MAINTENANCE COSTS DROP. *Petrol. Refiner 36,* 174 (1957) January.

A graphical summary of a survey of the range of annual maintenance costs for refineries, natural gasoline plants and petro-chemical plants expressed as percent of replacement value. G. G. Wilson

WHEN SHOULD EQUIPMENT BE REPLACED? *Petroleum Eng. 29,* D56-57 (1957) March.

Several methods are described for determining the economic life of equipment. The Caterpillar Tractor Co. "Metre" method is discussed with an accompanying chart and table to show how repairs, overheads, productivity and capital decline factors will indicate when it is best to replace equipment. G. Kunst

Pump Seals

Woodhouse, H. CENTRIFUGAL PUMP PACKINGS AND SEALS, PART 1—PACKING BOXES AND SEALS. *Petrol. Refiner 36,* 163-66 (1957) January.

The first of a 5-part series, this article is concerned with the construction features of packing boxes and glands. G. G. Wilson

Pyrometry

INDUSTRIAL MEASUREMENT OF GAS TEMPERATURE. *Brit. Coal Utilis. Res.*

Assoc. Quarterly Gaz. No. 30, 3-7 (1957)

A new form of temperature measuring instrument, called a venturi pneumatic pyrometer, has been developed for measuring temperatures of hot gases in industrial furnaces. The new instrument gives rapid response and can be used to give a direct reading of temperature. E. J. Pyrcioch

Screen Supports

Riedel, E. O. DIE ZULAESSIGEN STUETZWEITEN IN SIEBMASCHINEN. (THE PERMISSIBLE SUPPORT WIDTH IN SIEVE MACHINES.) *Erdoel und Kohle* (German) *10*, 164-5 (1957) March.

A formula for the permissible support width of sieving screens was developed and has been proved by experience with wear and maintenance. G. Kunst

12. MATERIALS OF CONSTRUCTION AND CORROSION

Cathodic Protection

Doremus, E. P. and Davis, J. G. MOBILE PLATFORMS GET CATHODIC PROTECTION. *World Oil 144*, 129-135, (1957) January.

A condensation of a paper presented at the March, 1956, National Assoc. Corrosion Engineers convention. It summarizes experience with the cathodic protection of the submerged zone of approximately 100 off-shore drilling platforms. G. G. Wilson

Johnson, W. TAKE THE MYSTERY OUT OF RECTIFIERS. *Pipe Line Ind. 6*, 39-44 (1957) March.

Knowledge of basic operating principles, rating limits and design features will lead to top performance. To get the best service from today's rectifiers, take advantage of manufacturer's recommendations. Author's Abstract

Schmitt, A. E. LONG RANGE PREVENTIVE MAINTENANCE PLAN FOR STEEL GAS MAINS. *Gas 33*, 49-53 (1957) February.

The author presents an ideal preventive maintenance plan. Considerable emphasis is placed on the value of corrosion control by cathodic protection, and a suggested organizational relationship between the corrosion control group and the maintenance and construction groups is presented. G. G. Wilson

Taylor, D. M. HOW ARE PIPELINES BEHAVING IN THE GULF CORROSIONWISE? *Petroleum Eng. 29*, D24-25 (1957) March.

A survey of several companies operating pipelines in the Gulf of Mexico shows that in many cases cathodic protection works better in salt water than on land. The chief difficulty comes from mechanical damage to protection equipment from action of the sea. G. Kunst

Coatings

Chibnik, S. 1956 REVIEW OF THE PAINT INDUSTRY. *Paint and Varnish Production 47*, 5-110 (1957) February.

Technological developments in the paint industry during 1956 are presented in the form of brief abstracts of technical publications and patents. An appendix to this summary contains and up-to-date Product Listing, and listings of suppliers, suppliers trade names, and trade associations with their addresses. G. G. Wilson

Morton, B. B. SPLASH ZONE PROTECTION FOR OFFSHORE STRUCTURES. *World Oil 144*, 125-128, (1957) January.

A brief discussion of the use of 14-18 page monel sheathing to protect the splash-zone of off-shore drilling platforms. G. G. Wilson

Corrosion

Romanoff, M. RESULTS OF BUREAU OF STANDARDS' 45-YEAR CORROSION STUDY. *Petroleum Eng. 29*, D20-23 (1957) March.

A summary is given of the results of Bureau of Standards' study of soil properties as related to corrosion of metals and methods of reducing losses learned from a field exposure program involving 37,000 specimens. The complete record is given in NBS Circular 579, "Underground Corrosion." G. Kunst

Gondouin, M., Tixier, M. P. and Simard, G. L. AN EXPERIMENTAL STUDY OF THE INFLUENCE OF THE CHEMICAL COMPOSITION OF ELECTROLYTES ON THE SP CURVE. *J. Petrol. Tech. 9*, 58-70 (T. P. 4455) (1957) February.

In the quantitative interpretation of the SP logs, the electrochemical component generally taken may be misleading when relatively large quantities of salts other than NaCl are present

in formation waters. In such cases changing the K value or adding a correction to the equation is unusual. Investigation of the influence of HCO_3^-, $SO_4^=$, Ca^{++}, and Mg^{++} on the SP deflection, included the activity coefficients of Ca^{++} and Mg^{++}. The theory, techniques, and a tentative method for applying the results are described. So far, applications to actual field cases have provided confirmation of the proposed method. Authors' Abstract

Stormont, D. H. CORROSION RATES DIRECTLY MEASURED BY NEW RESISTANCE METHOD. *Oil Gas J. 55,* 85-87 (1957) January 21.

A brief account of the uses of the Crest Instrument Co. "Corrosometer" in the determination of corrosion rates and the evaluation of chemical inhibitors and the effectiveness of cathodic protection. G. G. Wilson

Waber, J. T. STUDY OF A SIZE EFFECT IN GALVANIC CORROSION. *Corrosion 13,* 95t-102t (1957) February.

Distribution of potential within a corrodent was analyzed using several geometric arrangements of electrodes which lay in a common surface. Polarization was assumed to follow Wagner's useful relation as it varied from point to point on the electrode in response to the local corrosion current. The distribution of the corrosion attack over the anode also was studied. It was found that there was a size effect in the galvanic corrosion studied with the detailed behavior depending to a great extent on whether the electrodes were larger or smaller than was analyzed using several geometric arrange-Wagner's polarization parameter. It was found also that the potential of a galvanic couple depended on the relative areas of the two electrodes, as well as on their open cell potentials. Author's Abstract

Inhibitors

Fischer, P. W. (assigned to Union Oil Co.) CORROSION PREVENTION IN GAS RECOVERY SYSTEMS. U. S. 2,776,870 (1957) January 8.

This patent relates to the use of certain heavy metal soaps of carboxylic and sulfonic acids and a reaction product of a fatty acid or a fatty oil with an alkanol amine as a corrosion inhibitor in acid gas removal systems utilizing amines. G. G. Wilson

Stevens, E. G. HOW TO STOP CORROSION, BUT NOT PRODUCTION. *World Oil 144,* 174, (1957) January.

A new type of inhibitor which is heavy, water-dispersible and oil-insoluble is briefly described. A major advantage claimed is that the inhibitor will disperse itself in oil-well water without the necessity of circulating the well.

G. G. Wilson

13. NEW BOOKS

Diffusion

Crank, J. THE MATHEMATICS OF DIFFUSION. Oxford: Clarendon Press, 1956.

The basic differential equations of the diffusion process are derived. These equations are then extended to both two- and three-dimensional systems: plates, cylinders, and spheres are considered. Both analytical and graphical solutions of many boundary value problems are presented. Simultaneous diffusion and chemical reaction are also considered. P. B. Tarman

Flow in Pores

Carman, P. C. FLOW OF GASES THROUGH POROUS MEDIA. New York: Academic Press Inc.; London, Butterworths Scientific Publications (1956).

The object of the author was to present an integrated and, as far as possible, a quantitative account of the flow processes involved when gases flow into or through porous media. Flow produced by pressure, concentration and temperature gradients are discussed. Principle emphasis is on viscuous flow, with a brief treatment of the region of transition to turbulent flow. B. E. Eakin

Petroleum Production

Uren, L. C. PETROLEUM PRODUCTION ENGINEERING. 4th Ed., New York: McGraw-Hill Book Company, Inc. (1956).

The object of the author has been to revise his earlier text to reflect the great advances in the quantitative aspects of petroleum engineering. The primary purpose of this test is to serve the engineering student in his first survey of reservoir engineering problems, and, therefore, many of the recent mathematical developments are listed fully by reference to original papers. A large classified bibliography is included for each chapter. B. E. Eakin

SERVICES TO READERS

Bibliographies and Literature Searches

The library will prepare bibliographies and make literature searches on a cost basis plus a service charge. A comprehensive statement detailing the problem must be presented with the request.

Photocopies

Photostatic or microfilm copies of articles abstracted in *Gas Abstracts* are available at cost.

Abstracts on Cards

Copies of all abstracts in *Gas Abstracts* are available on 5 x 8 cards; information on this service will be furnished on request.

Russian Translations

English translations of Russian articles abstracted herein can be supplied by arrangement with the abstractor.

Periodicals Abstracted for GAS ABSTRACTS

Air Conditioning, Heating and Ventilating
Air Pollution Association, Journal
American Chemical Society, Journal
American Gas Association Monthly
American Gas Journal
American Institute of Chemical Engineers, Journal
American Petroleum Institute Quarterly
American Society for Testing Materials Bulletin
American Society of Mechanical Engineers. Transactions
Analytical Chemistry
Appliance Manufacturer
Association for Computing Machinery, Journal
Australian Journal of Applied Science
Australian Journal of Chemistry

Bituminous Coal Research Reports
Brennstoff-Chemie
British Coal Utilization Research Association Monthly Bulletin and Quarterly Gazette
Butane-Propane News

California Oil World
Canadian Chemical Processing
Canadian Gas Journal
Canadian Journal of Chemistry
Canadian Journal of Physics
Canadian Journal of Technology
Chemical and Engineering News
Chemical and Process Engineering
Chemical Engineering
Chemical Engineering Costs Quarterly
Chemical Engineering Progress
Chemical Engineering Science
Chemical Processing
Chemical Reviews
Chemical Society (London) Journal
Chemical Week
Chemistry and Industry
Coal Heat
Coke and Gas
Combustion
Combustion and Flame
Computers and Automation
Construction Methods and Equipment
Corrosion
Corrosion Technology

Drilling

Engineers' Digest
Erdöl und Kohle

Faraday Society. Transactions
Fuel
Fuel Efficiency
Fueloil and Oil Heat

Gas
Gas Age
Gas and Oil Power
Gas Council (British) Publications
Gas Heat
Gas Journal
Gas Times
Gas und Wasserfach
Gas World

Heating, Piping and Air Conditioning

Independent Petroleum Association of America Monthly
Industrial and Engineering Chemistry
Industrial Finishing
Industrial Gas (American)
Industrial Gas (British)
Industrial Heating
Institute of Fuel (British). Journal
Institute of Gas Technology Publications
Institute of Petroleum (British). Journal
Institution of Gas Engineers. Bulletins, Communications and Transactions
Instruments

Jet Propulsion
Journal des Usines a Gaz
Journal of Applied Chemistry
Journal of Applied Mechanics
Journal of Applied Physics
Journal of Chemical Physics
Journal of Metals
Journal of Organic Chemistry
Journal of Petroleum Technology
Journal of Physical Chemistry
Journal of Research (National Bureau of Standards)
Journal of Scientific Instruments

Laboratory Practice
LP-Gas
Lubrication

Materials and Methods
Mathematical Aids
Mechanical Engineering
Metal Progress
Mining Engineering

National Advisory Committee for Aeronautics, Reports
National Fire Protection Association Quarterly
National Gas Bulletin of Australia
National Petroleum News
Nuclear Science and Engineering
Nucleonics

Official Gazette of the U.S. Patent Office
Oil and Gas Journal

Petroleum
Petroleum Engineer
Petroleum Processing
Petroleum Refiner
Physics and Chemistry of Solids
Physics Today
Pipe Line Industry
Power
Producers Monthly
Public Utilities Fortnightly

Radiation Applications
Refrigerating Engineering
Review of Scientific Instruments
Revue Generale du Gaz
Rivista dei Combustibili

Science
Svenska Gasverksföreningens Månadsblad
U.S. Bureau of Mines, Bulletins, Information Circulars, Reports of Investigations and Technical Papers
World Oil
World Petroleum

Announcing

INSTITUTE OF GAS TECHNOLOGY
RESEARCH BULLETIN
7

GASIFICATION OF PULVERIZED COAL IN SUSPENSION

by
C. G. von Fredersdorff
E. J. Pyrcioch
E. S. Pettyjohn

Sponsored by
THE GAS PRODUCTION RESEARCH COMMITTEE
of the
AMERICAN GAS ASSOCIATION

INSTITUTE OF GAS TECHNOLOGY
THE GAS INDUSTRY'S OWN EDUCATIONAL AND RESEARCH FACILITY
Affiliated with Illinois Institute of Technology
TECHNOLOGY CENTER
Chicago 16, Illinois

Price: $5.00

January, 1957

See Abstract on page 105 of this issue.